Synchronized Position and Hold Reorient Experimental Satellites - International Space Station (SPHERES-ISS), Phase I

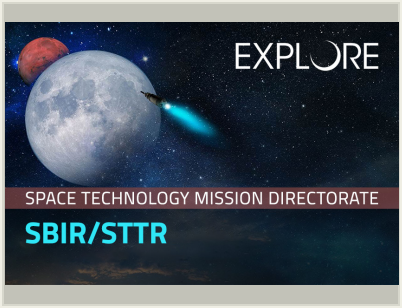
Completed Technology Project (2007 - 2007)

Project Introduction

Payload Systems Inc. (PSI) and the MIT Space Systems Laboratory (MIT-SSL) propose an innovative research program entitled SPHERES-ISS that uses their satellite formation flight laboratory (Synchronized Position Hold Reorient Experimental Satellites - SPHERES), currently operating aboard the International Space Station (ISS), to refine and validate NASA Goddard Space Flight Center's (GSFC) Pluribus algorithms. Pluribus supports "multiple systems in simultaneous, tightly-coupled, non-quiescent operations, such as robotic servicing and formation flying." SPHERES-ISS supports the same by providing a unique and cost-effective technology validation approach for algorithmic technologies that support robotic servicing and formation flight. This proposal is particularly relevant to SBIR Topic Area O1.02 Precision Spacecraft Navigation and Tracking by providing a pathway for maturing and validating technologies that are fundamental to multi-vehicle missions that support NASA's Vision for Space Exploration. . These include command and control of modular, replicated systems, robotic Earth and space science formation flown missions, in-space assembly, automated rendezvous and docking, formation flown sparse apertures, and the development of concepts of operations for such systems (e.g., software uplink protocols, required telemetry sets, fault detection and isolation).

Anticipated Benefits

Potential NASA Commercial Applications: Other international space agencies (e.g., ESA), and the DoD are all interested in formation flight missions and are active participants in the SPHERES program. The successful implementation of the SPHERES-ISS program should inspire other research organizations to propose to and participate in the SPHERES Guest Investigator Program. This could lead to additional launch opportunities for SPHERES hardware on subsequent ISS missions, which would most likely involve Payload Systems as the prime contractor for flight hardware development. Furthermore, there are multiple opportunities for commercial sale of SPHERES elements for ground testing by investigators wishing to participate in the SPHERES Guest Scientist Program.



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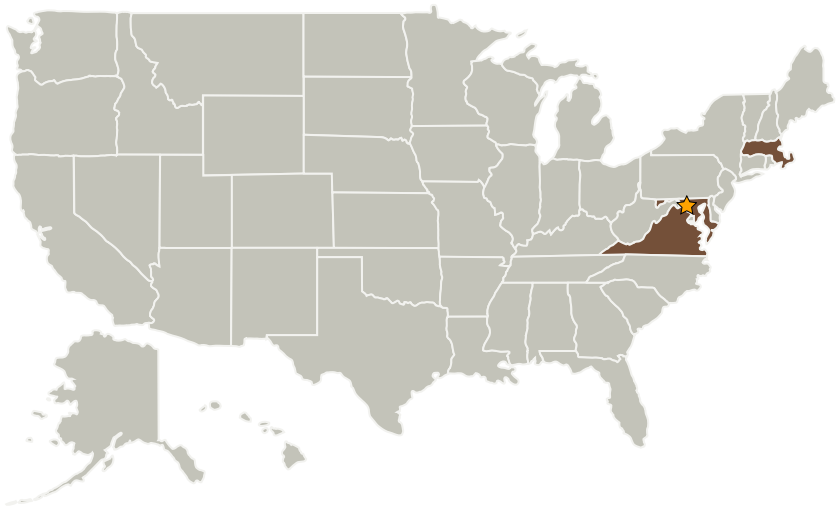
Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
★Goddard Space Flight Center(GSFC)	Lead Organization	NASA Center	Greenbelt, Maryland
Aurora Flight Sciences Corporation	Supporting Organization	Industry	Cambridge, Massachusetts

Primary U.S. Work Locations	
Maryland	Massachusetts
Virginia	

Project Transitions

January 2007: Project Start

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Goddard Space Flight Center (GSFC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Joseph Parrish

Technology Areas

Primary:

- TX07 Exploration Destination Systems
  - TX07.2 Mission Infrastructure, Sustainability, and Supportability
    - TX07.2.1 Logistics Management

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July 2007: Closed out

Closeout Summary: Synchronized Position and Hold Reorient Experimental Satellites - International Space Station (SPHERES-ISS), Phase I Project Image